

Impact of the NYS IPM Program's Network for Environment & Weather Awareness (NEWA) on agricultural production

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Abstract: The impact of the Network for Environment & Weather Awareness (NEWA) on pest and crop management was evaluated via a survey conducted by The Survey Research Institute (SRI), Cornell University. The phone survey was completed with 682 people, including 129 NEWA users and 553 non-users. Twenty-four questions were developed to ascertain the impact of NEWA. NEWA users reported that they can save, on average, \$19,500 per year in spray costs and prevent, on average, \$264,000 per year in crop loss as a direct result of using NEWA pest forecast models. Temperature, precipitation and weather forecasts were the most important weather information. NEWA users primarily seek weather data. They suggested more instructions on how to use NEWA information to make it easier to access and interpret. Putting more weather stations in the network was most frequently selected for how to improve NEWA. 99.2% of NEWA users would recommend NEWA to farmers.

Background and Justification: Weather information is crucial to managing pests and is pivotal to IPM practices. NEWA was established in 1996 to serve fruit and vegetable growers by delivering weather data from weather stations on farms to a website displaying the weather information and associated pest risk forecast outputs. Member fees were charged to offset costs until 2002 when NYS IPM assumed full responsibility for the network. Outcomes and impacts of NEWA have not been assessed since 1999. Since open access to the NEWA website in 2002, it is being visited by twice as many users (over 128,000 visits in 2007). At this time, therefore, it was imperative to survey key users of NEWA, as well as non-users, in order to quantify its impact, plan for future improvements, and justify future funding.

Objectives:

1. Develop a series of 10 to 20 questions, collecting a total of 20 data points, on key impacts of NEWA.
2. Develop a database of at least 500 names and phone numbers of growers, consultants, etc. who routinely use NEWA information, focusing on onion, potato, grape, and apple growers.
3. Contract with The SRI to conduct a phone-based survey.
4. Project Evaluation – the SRI will analyze the survey responses and results.

Procedures:

1. Develop a series of 10 to 20 questions, collecting a total of 20 data points, on key impacts of NEWA.

Questions were developed by Carroll, reviewed by Petzoldt, TenEyck and Gibbons and finalized by the Survey Research Institute (SRI) into a questionnaire (see Results). Surveys were

developed and designed to last approximately 5 minutes and to help assure a high level of meaningful responses. The survey aimed to determine the impact of the NYS IPM Program's Network for Environment & Weather Awareness (NEWA) on pest and crop management of four major commodities, onions, potatoes, grapes, and apples. The survey was aimed at those who might not use or be aware of NEWA, as well as those who do use NEWA. Flow of the survey took NEWA users through a series of 22 to 23 questions whereas non-users exited the survey after question 9.

2. Develop a database of at least 500 names and phone numbers of growers, consultants, etc. who routinely use NEWA information, focusing on onion, potato, grape, and apple growers.

The target of 500 names was exceeded because we chose to also survey non-users of NEWA in an effort to identify reasons why they may not be using the NEWA system. An anonymously sourced database of registered NEWA users, apple, grape, onion, and potato farmers and industry personnel was developed. The final sample provided to the SRI consisted of 942 individual names with phone numbers.

3. Contract with The SRI to conduct a phone-based survey.

The SRI was contracted to conduct a telephone survey of members of NEWA and other potential users in the agricultural and plant industry. Surveys were conducted over the phone by trained SRI interviewers. An introduction to the survey of six statements about NEWA was developed and read by the interviewers to place the survey in context for phone respondents. All interviews were conducted using a Computer Assisted Telephone Interviewing (CATI) software system. Data collection began on January 15, 2007. Data collection ended March 19, 2007.

4. Project Evaluation – the SRI will analyze the survey responses and results.

The SRI collated and analyzed the survey responses. To achieve a 95% confidence on the survey results, approximately 895 surveys would need to have been completed out of the 942 sample.

Results and discussion:

Table 1. Response Outcome.

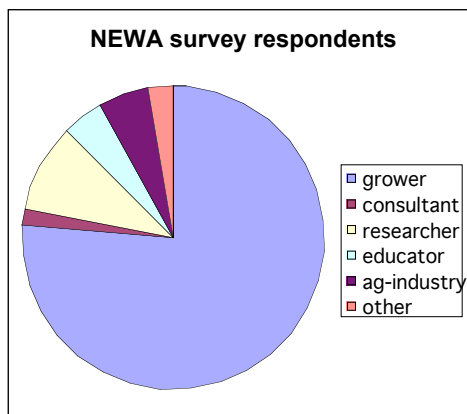
Outcome	Total
Completed survey	682
Bad #	101
Too Ill/Dead	0
Language problem	0
Ineligible (wrong business)	64
Refused	9
Pending	86
Total	942

In total, 682 surveys were completed out of 777 people reached (Table 1), excluding those who were ineligible and bad numbers. Though not reaching a 95% confidence, this response rate of 88% was considered satisfactory.

A series of 24 multiple choice/choose one questions was developed and survey flow designed to accommodate answers from people who were not users of NEWA as well as those who were. One specific question for each commodity group (apple, grape, onion, or potato) was included. The results for questions and series of questions are given below within the context of the survey.

Survey Results

1. How would you best describe yourself?



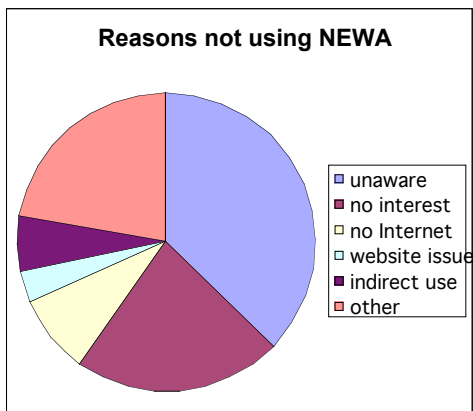
2. Does weather influence your pest management decision-making or advice? Y/N – The majority, 94% of respondents, answered yes to this question.

3. Did you know that insect, disease and weed development can be predicted from weather data? Y/N – 89% answered yes.

4. Were you aware that the New York State IPM Program supports a network of weather monitoring instruments in New York called NEWA? Y/N – 72% were aware of NEWA.

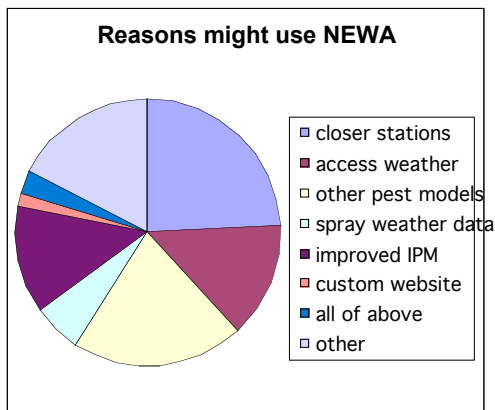
5. Have you ever used NEWA? Y/N – Only 29%, 198 respondents, had ever used NEWA.
If no → answered questions 7, 8, & 9, then exited survey.

6. Do you currently use NEWA? Y/N – Only 63% of the 198 are currently using NEWA.
If no → answered questions 7, 8, & 9, then exited survey.
If yes → skip to question 9.

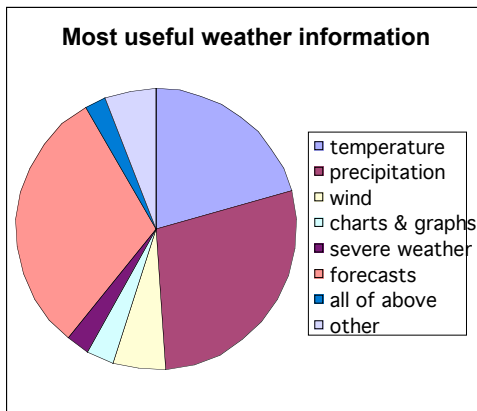


Before exiting the survey, all respondents helped us determine how to promote NEWA usage and improve its utility by answering questions 7, 8, and 9.

7. If not using NEWA, is it primarily because... Most (37% of 549 respondents) were unaware of NEWA, 23% were not interested, and 22% had other reasons. No or slow Internet dissuaded 9% and 3% had website issues (log in page confusion, too many clicks, and difficult navigation.) From survey notes, 6% were found to use NEWA indirectly through extension educators and consultants.



8. If no, what would make you want to use a system like NEWA? The reasons most chosen included weather stations closer to their location (24%), access to past, current, and forecasted weather (14%), pest forecasts for my crops (21%) and improved IPM decision-making (13%). Other (20%) included people not interested in pest forecast models and those with access to weather data from their own instruments.

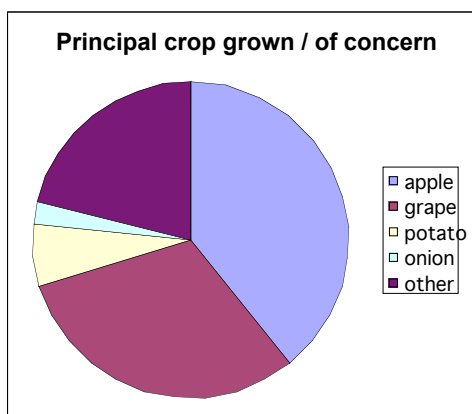


9. What type of weather information do you find most useful? People in agricultural settings are interested primarily in temperature, precipitation and weather forecast information as these comprised over 80% of the responses. Growers also chose wind speed and direction (6%) and many specifically cited wind information in the notes taken during the survey. Increasingly, wind data included in spray records is being requested under sustainable certification programs.

553 respondents exited the survey here. 129 NEWA users answered the remaining questions.

10. When you access the NEWA website...
 70% do so by themselves, without help
 18% have someone do it for them
 12% both

11. Do you interpret NEWA pest forecast and weather information and send this to other people via newsletters, email, or websites? Y/N – The majority, 82%, are accessing NEWA information for their own use. Only 18% are extending the information to others.



12. What crop do you primarily grow or work on?

50 apple growers
 40 grape growers
 8 potato growers
 3 onion growers
 27 other crops

This demographic shows that NEWA-user respondents to the remaining questions were primarily people who grow or work on apple and grape.

- 50 Apple people** – Which one of the following pest forecast models do you find most useful?

8% apple scab spore maturity (4)
 14% apple scab infection events (7)
 12% fire blight, Cougarblight (6)
 4% insect degree-day models (2)
 6% apple pest degree day calculator (3)
 48% all (24)
 4% none (4)

- 40 Grape people** – Which one of the following pest forecast models do you find most useful?

13% downy mildew, DMCast (5)
 8% black rot (3)

0% Phomopsis
 23% powdery mildew (9)
 54% all (21)
 2% none (1)

3 Onion people – Which one of the following pest forecast models do you find most useful?

0% Botrytis leaf blight, Blight Alert
 0% Botrytis leaf blight, Michigan Forecast
 0% downy mildew
 0% Alternaria, purple blotch
 33% onion maggot (1)
 67% all (2)
 0% none

8 Potato people – Which one of the following pest forecast models do you find most useful?

63% late blight (5)
 0% early blight
 25% both (2)
 12% none (1)

Strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree summaries (Fig 1).

13. NEWA pest forecast information helps me reduce the number of sprays I apply to control diseases, insects, mites, or weeds.

14. NEWA pest forecast information improves the timing of my spray applications.

15. NEWA pest forecast information alerts me to the risk of pest damage.

16. NEWA pest forecast information enhances IPM decision-making for my crops.

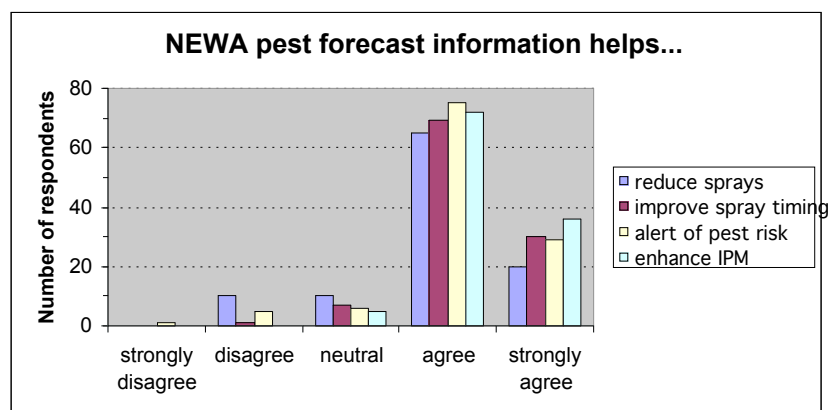


Figure 1. Reactions of respondents to four statements (questions 13, 14, 15, and 16) about NEWA. For each statement, a number of respondents answered that it did not apply to their situation (21, 21, 11, and 15, respectively.)

No one disagreed with the statement that NEWA enhances IPM decision-making for their crops. The only statement to which one respondent strongly disagreed was that NEWA pest forecasts alert me to the risk of pest damage: most likely because pest developmental models often alert to infection events that have already occurred in the previous 12 to 24 hours. Ten people disagreed with the statement that NEWA helps reduce the number of sprays, more than for any other statement: likely because during wet years pest models may call for more sprays to keep some fungal diseases under control.

17. Have you (or someone you advise) ever saved money by reducing spray inputs as a direct result of using the NEWA pest forecast models? Y/N – 64% responded yes.

18. If yes, in your estimation, what is the largest dollar amount saved in a single year on a spray bill as a direct result of using the NEWA pest forecast models?

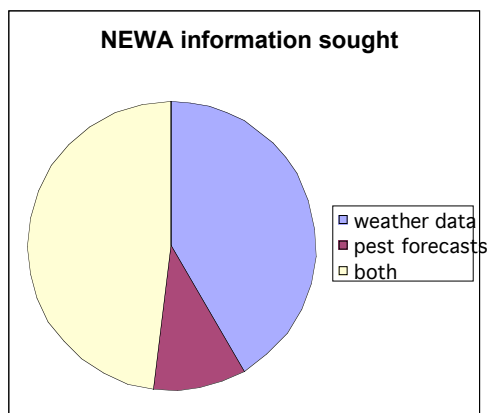
43 of 88 respondents reported that they can save on average \$19,480 per year in spray costs. Answers ranged from \$100 to \$500,000 per year, median \$4,500 and mode \$2,000. Of interest to business management specialists, 44 respondents did not know (only one refused to answer.)

19. Have you or someone you advise ever prevented crop loss as a direct result of using the NEWA pest forecast models? Y/N – 41% responded yes.

20. If yes, in your estimation, what is the largest dollar amount saved in a single year by preventing crop loss as a direct result of using the NEWA pest forecast models?

25 of 62 respondents reported that they can prevent on average \$264,264 per year in crop loss. Answers ranged from \$100 to \$4,000,000 per year, median \$12,000 and mode \$10,000. Of interest to business management specialists, 36 respondents did not know (only one refused to answer.)

21. I access NEWA primarily for...



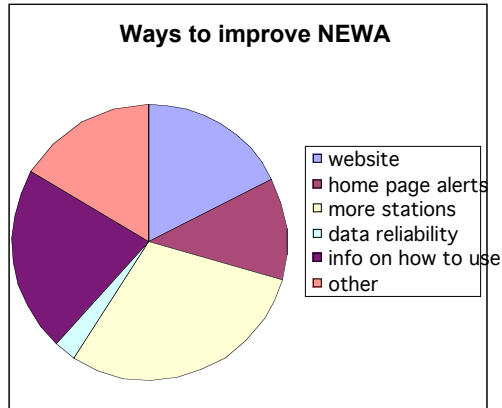
The overwhelming majority, 90%, of NEWA users are seeking weather information. As one grower has told Carroll, “Weather is the number one most important thing for a farmer to know.”

From survey notes and open-ended responses, we need to do a better job of displaying and explaining the pest forecast results on the NEWA website, making them accessible, understandable, and easily extended through multiplier audiences.

22. Do you understand how to use NEWA information for IPM and crop management? Y/N – 86% answered yes to this question. However, the question does not specify whether the NEWA information used is the pest forecast information or the weather information. Some respondents may utilize weather data directly for IPM and ICM decisions.

23. Would you recommend NEWA to farmers? Y/N – 99.2% replied, “yes”; only one respondent replied, “no.” This is excellent. This result underscores the usefulness of NEWA information and demonstrates that there is a strong future for NEWA.

24. In what way could NEWA be improved?



The most frequent response (29%) was the need to put more weather stations into the network. Second to that (22%) was to provide instructions for weather and pest forecast information. This, plus the 12% suggesting pest alerts on the home page, underline the need to do a better job of displaying and explaining the pest forecast results on the NEWA website. Data reliability was cited by only 3%.

Outcomes/Impacts: The survey yielded specific results on the following:

a) Number of producers using IPM pest forecast models through NEWA.

Of the 125 respondents to question 21, 73 are using the NEWA pest forecast models. The survey identified the need to provide pest forecast models for additional crops which would boost this number. We need to do a better job of displaying and explaining the pest forecast results on the NEWA website, making them accessible, understandable, and easily extended through multiplier audiences. Putting more weather stations in the network was most frequently cited as a way to improve NEWA and this would also boost numbers of farmers utilizing NEWA pest forecasts.

b) Economic benefit of NEWA to producers.

NEWA users reported that they can save, on average, \$19,500 per year in spray costs and prevent, on average, \$264,000 per year in crop loss as a direct result of using NEWA pest forecast models. Those managing large acreages of high-value crops reported they can save up to \$0.5 million in spray costs and prevent up to \$4 million in crop loss using NEWA.

c) Reduction in pesticide sprays and associated risk to the environment and/or health.

NEWA helps reduce the number of sprays applied to control pests – 81% agreed with this statement (19% strongly). NEWA improves the timing of my spray applications – 92% agreed with this statement (28% strongly). These results show that NEWA has positive impact on reduction of pesticide use and associated risks.

d) Level of improved IPM decision making.

NEWA pest forecasts enhance IPM decision-making – 96% of users agreed with this statement (32% strongly). No one disagreed with this statement. When non-users were asked what would motivate them to use NEWA, 13% selected “improved IPM decision-making” as their top choice (question 8.) NEWA has a positive impact on IPM practice and decisions for producers of high value crops.